ZPROM-64K
EPROM
PROGRAMMER
TECHNICAL MANUAL

BGD TECHNOLOGY
PO Box 209
Pewaukee, Wisconsin 53072

[REV 8612] COST $5.00

NEW!

BGD TECHNOLOGY is Proud to Announce...

ZPROM-64K

PROFESSIONAL GRADE EPROM PROGRAMMER KIT

Now the convenience, speed, and features of a commercial grade EPROM programmer are available for an affordable price! The ZPROM-64K is a full featured EPROM programmer for the serious electronics enthusiast.

The ZPROM-64K programmer is based on a powerful single board computer. This Z-80 computer has a full 64K bytes of RAM memory, two serial I/O channels, a 16 bit programmable parallel port, and an on board counter-timer chip. The processor connects to an EPROM programmer adaptor board through the parallel port, and communicates via a 9600 baud serial communications link to a CRT terminal or a personal computer. A full function machine monitor program, FIZZLE X.2, supports peek, poke, define breakpoints, execute user program, and more. Additionally, the following high level EPROM programming functions are supported:

- Display EPROM type
- EPROM Blank Check
- EPROM Read (Read Master into ZPROM-64K memory)
- Generate and Display EPROM CheckSum
- Generate and Display ZPROM-64K RAM CheckSum
- Display Memory Contents (Displays Hex and ASCII values)
- Modify ZPROM-64K RAM Data
- Fill RAM With Specified Value
- Program EPROM (From ZPROM-64K Memory)
- Verify EPROM (Compare With Memory Contents)
- Input Hex Tape Data (Accept Intel Hex formatted data)
- Output Hex Tape Data (Output Intel Hex formatted data)
- Display HELP Command Summary Screen

High speed intelligent programming algorithms assure data integrity, while achieving remarkable programming speed. Fully electronic EPROM socket power and programming voltage switching, prevents device damage during EPROM insertion and removal. Through the use of simple personality modules, ZPROM-64K will read and program the following EPROM families:

TYPE	SIZE	Vpp	PROGRAMMING TECHNIQUE
2716	- 2K X 8	25.0	50 Ms Programming Pulse
2732	- 4K X 8	25.0	50 Ms Programming Pulse
2732A	- 4K X 8	21.0	50 Ms Programming Pulse
2764	- 8K X 8	21.0	Intelligent Programming Algorithm
27128	- 16K X 8	21.0	Intelligent Programming Algorithm
27128A	- 16K X 8	12.5	Intelligent Programming Algorithm
27256	- 32K X 8	12.5	Intelligent Programming Algorithm

Additionally, the new CMOS families which utilize these standard programming voltages and sequences are also accommodated.

ZPROM-64K Power Requirements

Voltage	Current	Usage
+5	1.0 A Max	Logic Power Supply
+12	50 Ma Max	RS-232 Driver
-12	50 Ma Max	RS-232 Driver
+30	200 Ma Max	Used to Generate Vpp

ZPROM-64K Kit Pricing and Availability

KIT NUMBER	DESCRIPTION	PRICE	AVAILABILITY
ZPROM-64K-1	Blank Circuit Board Kit 1-Main Computer PWB 1-EPROM Prog. Adapter PWB 1-FIZZLE Program in EPROM 1-Parts List, Schematic, assembly and test guide	$59.00	Sept. 1985
ZPROM-64K-2	Semiconductor Kit Contains all semiconductors, (Chips, transistors, Diodes) required for Main Computer and Programming adapter Also includes 4.9 Mhz Crystal	$65.00	Oct. 1985
ZPROM-64K-3	Capacitor-Resistor Kit Includes Vpp control resistors used in personallity modules	$16.00	Oct. 1985
ZPROM-64K-4	Connector/Interconnect Kit Includes Headers and inter-board ribbon cable parts	$19.00	Oct. 1985
ZPROM-64K-5	28 Pin TEXTOOL ZIF Socket	$12.00	Oct. 1985
ZPROM-64K-6	16 Pin ZIF Socket (For Personality Modules)	$ 8.00	Oct. 1985

To order, please specify the items desired and send check or money order to:

Phone orders call:
(414) 781-3567
or
(414) 691-2885

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PO Box 209
Pewaukee, Wisconsin
53072

Master Card & Visa Accepted

Please enclose $3.50 postage and handling. Wisconsin Residents, Please include 5% state tax.

ZPROM-64K ASSEMBLY AND TEST GUIDE

Note: The ZPROM-64K is a complex computer based product. The assembly, test, and calibration of this product is a complex process and should only be undertaken by those skilled in electronics and computer techniques. Damage to the circuit board and its components may result if extreme care not is exercised. The instructions and guidelines included herein are directed towards individuals possessing skills and understanding of electronic assembly and computer techniques. A basic understanding of micro-processor assembly and machine language is also helpful. It is further assumed that EPROM technology and programming EPROM programming fundamentals are understood.

PRE-ASSEMBLY TASKS

Prior to beginning assembly, familiarize yourself with the circuit board and components. Study the parts placement diagram and achieve a solid understanding of the actual parts placement and installation you will be performing.

Before beginning the installation and soldiering process, carefully inspect the circuit board(s) for any damage to runs or pads which may have occurred. Perform a ohm meter check of the +5, +12, and -12 power connector pads with respect to the ground power connector pad. This should show as an OPEN CIRCUIT. If there are any shorts identified at this time, carefully inspect the board for hair line shorts or soldier splashes resulting from the board tinning process. Checking and correcting faults at this point will avoid frustration and prevent damage to circuit components later!

CPU BOARD ASSEMBLY

[ ] - Install all by-pass capacitors as shown on the parts placement diagram.

[ ] - Install IC sockets at each of the IC locations as shown on the parts placement diagram. Be sure to observe pin 1 polarity for each socket/IC location. NOTE: While all IC's may be soldered directly into the circuit board, the use of IC sockets is highly recommended.

[ ] - Install all resistors into the circuit board as shown on the parts placement diagram.

[ ] - Install all diodes into the circuit board as shown on the parts placement diagram. Be sure to observe diode polarity as shown.

[ ] - Install all transistors into the circuit board as shown on the parts placement diagram. Be sure to observe transistor orientation as shown.

[ ] - Install all remaining capacitors into the circuit board as shown on the parts placement diagram. Be sure to observe correct polarity for all polarized capacitors.

[ ] - Install the 26 pin header into the circuit board as shown on the parts placement diagram. Be sure to observe correct connector orientation (if a shrouded connector with pin 1 markings is used).

[ ] - Install any other remaining headers into the circuit board as shown on the parts placement diagram.

[ ] - Install the crystal into the circuit board as shown on the parts placement diagram.

CONNECTION OF THE RESET SWITCH

[ ] - A CPU reset switch may be board mounted (See parts list for exact switch type to be used) or remotely mounted. Any single pole, normally open momentary contact [spring loaded] switch maybe used. Wire the switch as indicated on the schematic to the pads on the circuit board.

INSPECTION

Place place your circuit board next to the parts placement diagram and carefully check for the correct installation of all parts. Especially check to ensure the correct orientation has been achieved for all polarity sensitive parts (this includes socket orientation).

At this point, all of the component soldiering work is completed on the CPU circuit board. Carefully inspect your work! Look for cold soldier joints as well as soldier "splashes" which may be shorting adjacent conductors. Problems found and resolved at this point will reduce frustration and avoid damage to the components when power is applied!

POWER/GROUND CHECKS [BEFORE IC'S ARE INSTALLED!]

At this point, you can place an ohm meter from the +5 volt power input connector pad and ground. There should be a high resistance shown on the ohm meter (>10K ohms). If the ohm meter reading is less than 10K ohms, carefully re-inspect your work looking for excess soldier shorting adjacent conductors.

Repeat this test for the +12 V and - 12 V power connectors.

EPROM JUMPER SELECTION

The MEMORY SELECT HEADER shown on the parts placement diagram sets the EPROM address and chip select decoding appropriately for the EPROM which is installed on the ZPROM-64K-CPU board. Any EPROM from a 2732 through a 27256 can be used on the board. The jumper table provided shows the jumper placement for the various EPROM types. To determine the configuration needed for use with the pre-programmed EPROM supplied with your ZPROM-64K CPU board set, simply check the part number of the EPROM supplied and set the jumpers as required.

Note: Jumpers may be set with either short pieces of insulated wire soldered into the circuit board, or slide on jumpers placed on a 6-pin single in-line header installed at the EPROM SELECT HEADER site. Alternately, "wire wrap" connections to the single in-line headers may also be used.

Z-80 SIO MODIFICATIONS [ONLY REQUIRED FOR SIO/1 CHIPS]

Several versions of the Z-80 serial communications chip used on the CPU board are available. The circuit board may be used without any special modifications with a "DART" or SIO/0 component. If you are using a SIO/1 serial communications chip, the following small change is required.

NOTE: USE CARE NOT TO DAMAGE OTHER RUNS WHEN MAKING THESE MODIFICATIONS.

[ ] 1.) Cut the copper run from Pin 4 of IC15 [1489], and Pin 26 of IC17 [SIO].

[ ] 2.) Add a small insulated jumper wire from Pin 4 of IC15 [1489] to Pin 25 of IC17 [SIO].

[ ] 3.) Add a small insulated jumper wire from Pin 26 to Pin 27 of IC17 [SIO].

See the SIO modification diagram included in this manual.

INSTALLATION OF IC's

CAUTIONARY NOTE: MANY INTEGRATED CIRCUIT COMPONENTS ARE SUSCEPTIBLE TO STATIC DISCHARGE DAMAGE. BE SURE TO "GROUND" YOURSELF TO THE CHIPS, THE CIRCUIT BOARD(s), AND EARTH GROUND WHEN REMOVING THE IC's FROM THEIR PROTECTIVE (CONDUCTIVE) FOAM PADS OR TUBES.

[ ] - Install all of the TTL components into their sockets as shown on the parts placement diagram.

[ ] - Install all of the Z-80 components into their sockets as shown on the parts placement diagram.

[ ] - Install all of the RAM components into their sockets as shown on the parts placement diagram.

[ ] - Install the pre-programmed EPROM supplied with the circuit board kit into its sockets as shown on the parts placement diagram.

INSPECTION

It is wise to perform a second visual inspection, this time taking care to confirm correct installation of all socketed components. Place your completed circuit board next to the parts placement diagram and carefully check for the correct installation of all parts. Especially check to ensure the correct orientation has been achieved for all polarity sensitive parts (this includes all integrated circuits).

At this point, the board is complete and ready for connection to a CRT terminal and DC power source. Refer to the wiring diagram supplied for an overview of the power and terminal connections.

CONNECTIONS TO CRT TERMINAL/COMPUTER

The ZPROM-64K CPU communicates to a CRT terminal (or Computer running a terminal emulation program), via a 9600 Baud, Half Duplex RS-232 link. There are two serial ports on the ZPROM-64K CPU, port A (on header number 3), and port B (on header number 4). Port B is used for CRT/Computer communications. No hardware handshake (RTS, CTS, DTR, etc.) is required by ZPROM-64K, however some computers and CRT terminals do need these signals to operate. Please see the CRT TERMINAL CONNECTION DATA diagram for a typical wiring configuration. You may need to consult your CRT/Computer manual for the details required for your particular installation.

INTERCONNECTION TO DC POWER

The power requirements of the ZPROM-64K-CPU are summarized below:

+ 5.0 V	+/- .25 V,	REGULATED, @ 1.0 Amp.
+12.0 V	+/- 1.0 V,	REGULATED, @ 50 Ma
-12.0 V	+/- 1.0 V,	REGULATED, @ 50 Ma

Prepare a power cable harness from the power supply (User supplied) and the CPU board. The power supply connection details are shown on the schematic and header pin-out summaries. Be sure that your power supply can meet these needs. The ZPROM-64K provides NO overvoltage or reverse voltage protection circuitry. Severe damage will result if incorrect power is applied to the ZPROM circuitry!

BE SURE TO VERIFY POWER SUPPLY WIRING AND VOLTAGES BEFORE CONNECTION TO THE CPU BOARD. SEVERE CIRCUIT DAMAGE MAY RESULT IF INCORRECT VOLTAGES ARE APPLIED TO THE ZPROM-64K CIRCUITRY

APPLYING POWER/INITIAL CPU TESTING

NOTE: THE EPROM ADAPTER BOARD DOES NOT NEED TO BE CONNECTED TO THE CPU BOARD FOR THESE INITIAL TESTS

As soon as pwer is applied (or upon manual reset via the reset button), the FIZZLE 0.4 monitor program will enter an automatic baud rate set-up loop. Here, the FIZZLE program monitors the serial input line from the CRT terminal/Host computer connected up to the "B" serial port. As the operator hits the RETURN key (Carrage Return), FIZZLE then measures the baud rate and adjusts its own transmission rate to that value. At this time, a sign-on message is sent to the CRT terminal/Host computer. If the operator depresses any key other than the a Carrage Return, an incorrect baud rate maybe determined. Should this happen, just reset the ZPROM-64 and repeat the Carrage Return/baud rate set-up process. All standard baud rates from 110-9600 baud are accomodated.

Once the baud rate is set, and the ">" prompt is present, all of the FIZZLE commands maybe tryed. You may use the various commands to perform memory and I/O port tests and checks. Just type "?" at the monitor prompt for a HELP SCREEN display of FIZZLE commands.

THINGS TO CHECK IF NO SIGN-ON MESSAGE APPEARS

[ ] - Is terminal connected and configured correctly? Is it set for 9600 Baud?

[ ] - Is correct power applied to ZPROM-64K CPU?

[ ] - Check serial link w/scope - Do you see a transmission burst on the TX-DATA line as ZPROM-64K CPU power is applied or reset switch is cycled?

[ ] - Check Xtal oscillation - it should be running at the stamped crystal frequency (about 5 Mhz).

[ ] - Check the clock pin of the CPU chip (Pin 6) - it should appear as a clean square wave, exactly 1/2 the frequency of the crystal used (about 2.5 Mhz).

[ ] - Check BAUD clocks going to the SIO chip - The Baud clock for Channel B should be 153.6 Khz (9600 x 16 Hz).

[ ] - Check dynamic RAM multiplexing circuitry - RAS, CAS, and the address multiplexer timing must be correct.

[ ] - Verify that the CPU READ and WRITE lines are not shorted or malfunctioning.

[ ] - With the CPU board EPROM removed, the CPU data bus will float during op-code fetches, causing the processor to receive a RST 38H command (FF Hex). The CPU will then continuously increment its address lines as it "PUSHES" return addresses onto the STACK. This is a good test for probing for address and data line shorts with an oscilloscope - Each address line should "look different."

Use standard digital/microprocessor test and debugging techniques to identify and resolve problems. Component documentation from ZILOG, TEXAS INSTRUMENTS and MOSTEK may be useful.

EPROM ADAPTER ASSEMBLY

[ ] - Install all by-pass capacitors as shown on the parts placement diagram.

[ ] - Install IC sockets at IC location U1 as shown on the parts placement diagram. Be sure to observe pin 1 polarity for each socket/IC location. NOTE: While all IC's may be soldered directly into the circuit board, the use of IC sockets is highly recommended.

[ ] - Install all resistors into the circuit board as shown on the parts placement diagram. When installing the SIP resistor packs, be sure to observe the proper pin 1 orientation.

[ ] - Install all diodes into the circuit board as shown on the parts placement diagram. Be sure to observe diode polarity as shown.

[ ] - Install all transistors and voltage regulators into the circuit board as shown on the parts placement diagram. Be sure to observe transistor orientation as shown. Use 4-40 hardware to secure the power transistor and voltage regulators to the circuit board. Be sure that the hardware does not cause shorts on the foil side of the circuit board.

[ ] - Install all remaining capacitors into the circuit board as shown on the parts placement diagram. Be sure to observe correct polarity for all polarized capacitors.

[ ] - Install the 26 pin header into the circuit board as shown on the parts placement diagram. Be sure to observe correct connector orientation (if a shrouded connector with pin 1 markings is used).

[ ] - Install any other remaining headers into the circuit board as shown on the parts placement diagram.

[ ] - Install the 28 pin ZIF socket as shown. Be sure to observe proper socket orientation.

[ ] - Install the 16 pin ZIF socket as shown. Be sure to observe proper socket orientation.

INSPECTION

Place place your circuit board next to the parts placement diagram and carefully check for the correct installation of all parts. Especially check to ensure the correct orientation has been achieved for all polarity sensitive parts (this includes socket orientation).

At this point, all of the component soldiering work is completed on the EPROM adapter circuit board. Carefully inspect your work! Look for cold soldier joints as well as soldier "splashes" which may be shorting adjacent conductors. Problems found and resolved at this point will reduce frustration and avoid damage to the components when power is applied!

CONFIGURATION HEADER CONSTRUCTION

[ ] - Prepare the required EPROM configuration headers as detailed pictorially in the diagrams included. Wire all components as shown except the RVPP resistor. Do not place a RVPP resistor at this time. The final resistor value required will be determined during header calibration.

[ ] - Repeat above procedure for each header type needed.

INTERCONNECTION TO DC POWER

The power requirements of the ZPROM-64K EPROM adapter board is summarized below:

+9-12.0 V, REGULATED or UNREGULATED, @100 Ma
+30 V, UNREGULATED, @ 100 Ma

> Note: The 9-12 Volt input of the adapter board can be the same +12 Volt source used on the CPU board (assuming the supply is capable of the current requirements of both boards).

Prepare a power cable harness from the power supply (User supplied) and the EPROM ADAPTER board. The power supply connection details are shown on the schematic and header pin-out summaries. Be sure that your power supply can meet these needs. The ZPROM-64K provides NO overvoltage or reverse voltage protection circuitry. Severe damage will result if incorrect power is applied to the ZPROM circuitry!

BE SURE TO VERIFY POWER SUPPLY WIRING AND VOLTAGES BEFORE CONNECTION TO THE CPU BOARD. SEVERE CIRCUIT DAMAGE MAY RESULT IF INCORRECT VOLTAGES ARE APPLIED TO THE ZPROM-64K CIRCUITRY

INTERCONNECTION TO CPU BOARD

[ ] - Prepare a 26 pin ribbon cable with female headers on each end. The total cable length should not exceed 5".

[ ] - Connect the cable between the EPROM board and the CPU board as shown in the wiring diagram. BE CAREFUL TO CONNECT THE CABLE WITH CORRECT ORIENTATION ON BOTH ENDS OF THE CABLE!

Vpp CALIBRATION

In order to ensure the correct programming voltage is applied to the EPROM to be programmed, the specific RVPP value must determined. Since there are some variables which would be difficult to compensate for, the following calibration procedure should be used for each header constructed.

The Calibration Process

1. Connect a 10K ohm variable resistor to the RVPP pins of the header be calibrated.

2. Connect a well calibrated volt meter (Digital Voltmeter Preferred) between pin 1 of the EPROM PROGRAMMING socket and GROUND, pin 14 of the EPROM PROGRAMMING socket. This meter will be used to measure the Vpp value.

3. Apply power to the ZPROM-64K.

4. Using the monitor program, "turn on" socket power and Vpp with by using the "OUTPUT TO PORT" command.

Output to port 70 H, the value 18 H

5. Adjust the potentiometer until the voltmeter reads the desired programming voltage (ie: 25.0 Volts for a 2716 module).

6. At this point, power may be turned off. The potentiometer value can be read using a well calibrated ohm meter, and an appropriate fixed resistor having the same value should be permanently installed on the header ⋆. After installing the fixed resistor, repeat the above procedure to verify the correct Vpp value has been obtained.

⋆ Alternately, a small PC mount 10K pot can be permanently wired to the header, and left connected as RVPP.

7. It is extremely important not to exceed the specified programming voltage value as damage to the EPROM being programmed can occur!

GENERAL EPROM PROGRAMMER OPERATION AND TESTS

After the whole kit has been completed and the header(s) calibrated, the basic programming features can be checked.

PT - PROM TYPE

Selecting the PT option on the CRT terminal should echo the PROM TYPE as coded on the configuration header.

Note: FIZZLE X.2 will show only the following PROM types: 2716 2732 2732A 2764 27128 27256. 2764A and 27128A will be identified by the PT command as 2764 and 27128 respectively. This is normal as the only difference between the "A" and standard part is the programming voltage. The programming algorithm used for both types is identical.

PR - PROM READ

Performing a PR with no EPROM in the programming socket should cause all FFH to appear in the CPU memory (starting at location 100H). Use the monitor level memory dump command to verify. Place an EPROM with a known pattern into the programming socket and type PR. The PROM data will be read into the programmer starting at Hex address 100. Using the monitor commands, Dump the memory data to the CRT and verify correct PROM read functionality.

PV - PROM VERIFY

After a PR command, a PV command will compare the contents of the EPROM with the contents of CPU memory (again, starting at location 100 H). A verify confirmation should occur.

PC - PROM CHECKSUM

This will calculate a PROM checksum of all of the data contained in the target EPROM.

PB - PROM BLANK Check

With the target socket empty, type PB. A confirmation of a blank EPROM should appear on the CRT. By placing a previously programmed part in the socket, a PB should result in a negative blank check message.

PP - PROM PROGRAM

Using the PR command, copy the contents of a known good programmed EPROM into the machine. Now, place a blank EPROM into the target socket and type PP. Following the instructions should correctly program and verify the new EPROM. Any errors detected should be performed.

GENERAL HINTS AND SUGGESTIONS

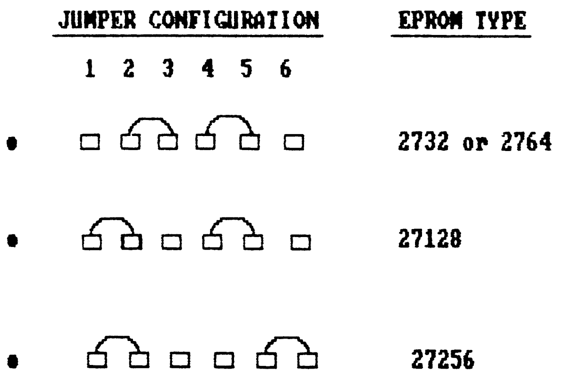
The following ideas are offered to provide general help and guidance in using the ZPROM-64K Programmer most effectively.

1. NEVER TURN POWER ON AND OFF WITH AN EPROM INSERTED IN THE PROGRAMMING SOCKET! A part left in the EPROM target socket maybe damaged or erroneously programmed during the power-up/power-down process.

2. PARTIAL EPROM BURNS - The ZPROM-64K will ALWAYS program the total address space of an EPROM. If you do not want to program some locations, those locations should be filled with FFH. This can be done through the monitor level memory fill and/or set-modify command. Locations having FFH leave the EPROM in its unprogrammed state.

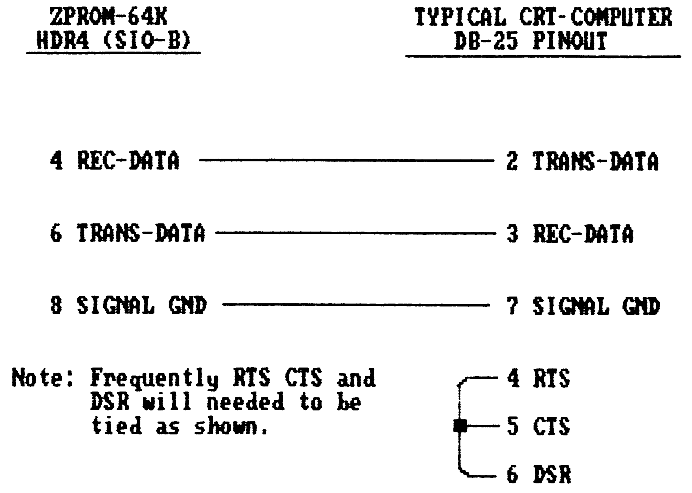
3. NEVER CHANGE EPROM CONFIGURATION HEADERS WITH AN EPROM IN THE PROGRAMMING SOCKET While power can remain on, header changes could erroneously program or damage an EPROM during installation or removal.

MEMORY SELECT HEADER DATA



This configuration data will set up the ZPROM-64K CPU board for the CPU resident EPROM. Note: FIZZLE X.2 is a 2764 EPROM.

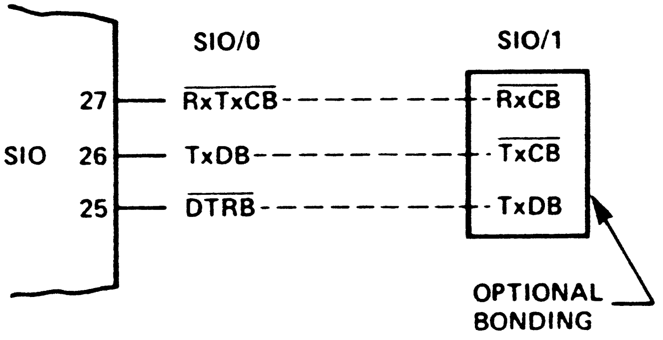
CRT TERMINAL CONNECTION DATA



Note: Frequently RTS CTS and DSR will needed to be tied as shown.

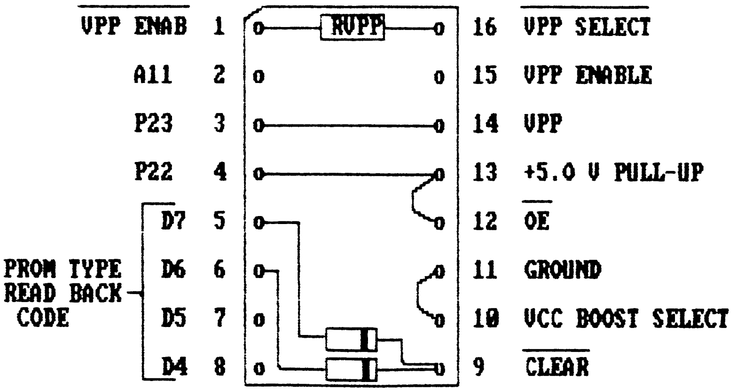
Note on Bonding Option:

Due to package constraints, there are only two pins available for the three signals, $\overline{\text{TxCB}}$, $\overline{\text{RxCB}}$ and $\overline{\text{DTRB}}$. They are normally bonded so that $\overline{\text{TxCB}}$ and $\overline{\text{RxCB}}$ are one pin, and $\overline{\text{RxTxCB}}$ and $\overline{\text{DTRB}}$ is an available output. If there is a requirement for different clock rates or phases for $\overline{\text{RxCB}}$ and $\overline{\text{TxCB}}$, they may be bonded independently by sacrificing $\overline{\text{DTRB}}$.



PROGRAMMING CONFIGURATION HEADER

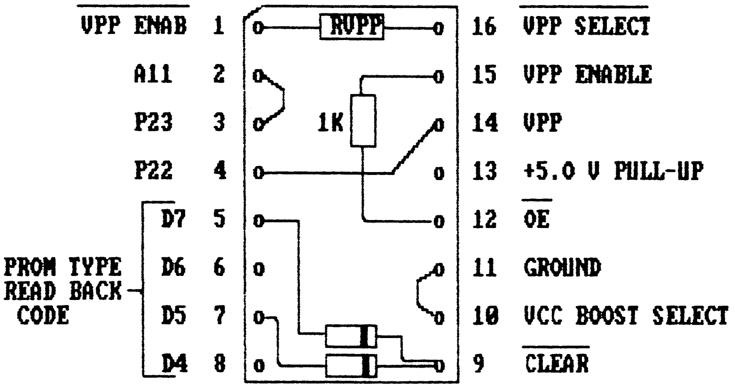
EPROM TYPE: 2716 PROG. VOLTAGE: 25.0
APPROXIMATE RVPP VALUE: 2.3K OHMS



(TOP VIEW OF HEADER IS SHOWN) ↖ DIODES (2) ARE SIL. SIGNAL TYPE

PROGRAMMING CONFIGURATION HEADER

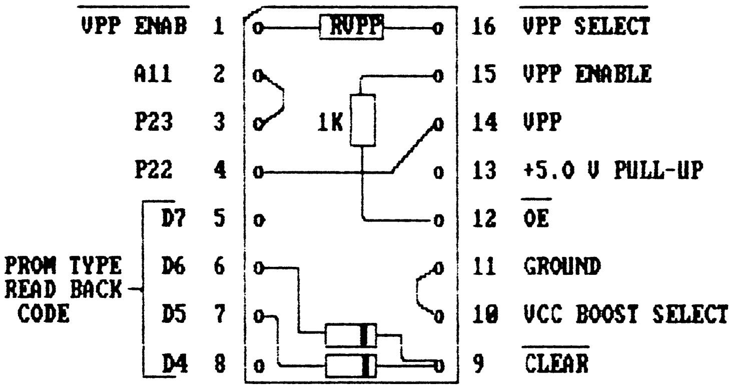
EPROM TYPE: 2732 PROG. VOLTAGE: 25.0
APPROXIMATE RVPP VALUE: 3.1K OHMS



(TOP VIEW OF HEADER IS SHOWN) ↖ DIODES (2) ARE SIL. SIGNAL TYPE

PROGRAMMING CONFIGURATION HEADER

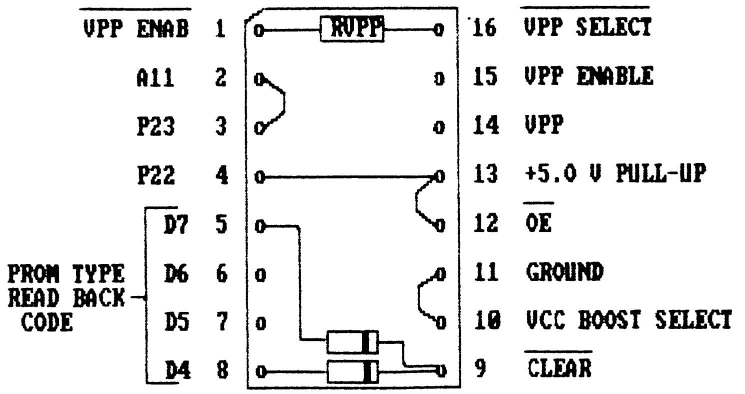
EPROM TYPE: 2732A PROG. VOLTAGE: 21.0
APPROXIMATE RVPP VALUE: 2.5K OHMS



(TOP VIEW OF HEADER IS SHOWN) ↖ DIODES (2) ARE SIL. SIGNAL TYPE

PROGRAMMING CONFIGURATION HEADER

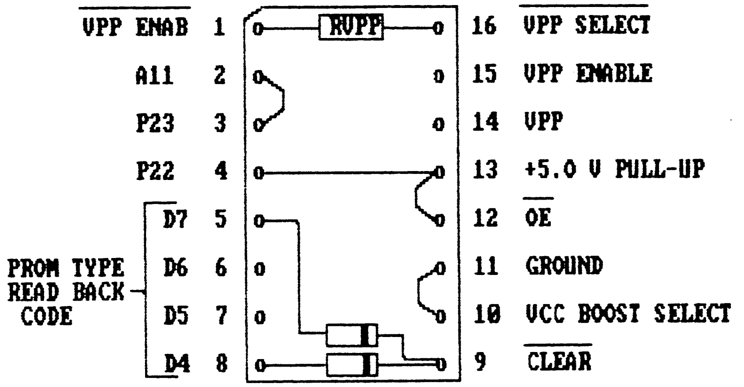
EPROM TYPE: 2764 PROG. VOLTAGE: 21.0
APPROXIMATE RVPP VALUE: 3.1K OHMS



(TOP VIEW OF HEADER IS SHOWN) ↖ DIODES (2) ARE SIL. SIGNAL TYPE

PROGRAMMING CONFIGURATION HEADER

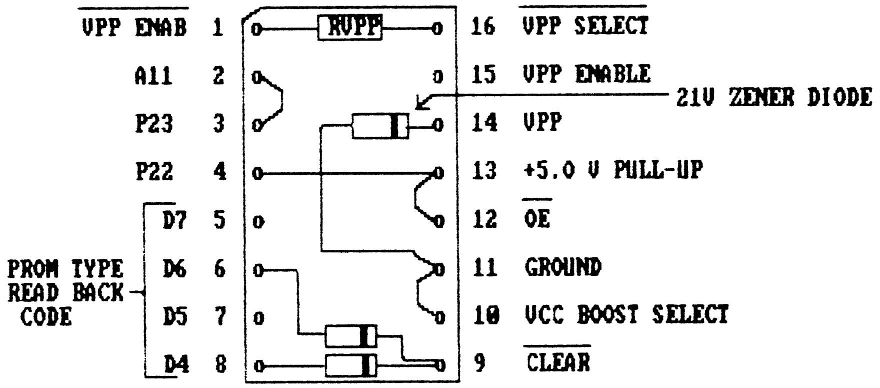
EPROM TYPE: 2764A PROG. VOLTAGE: 12.5
APPROXIMATE RVPP VALUE: 6.6K OHMS



(TOP VIEW OF HEADER IS SHOWN) ↖ DIODES (2) ARE SIL. SIGNAL TYPE

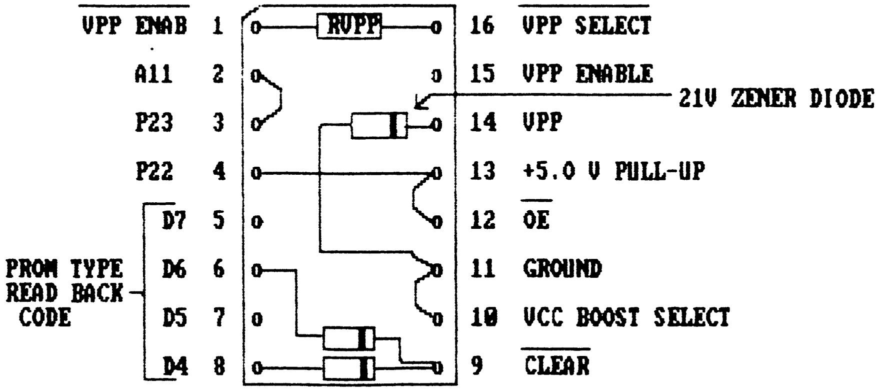
PROGRAMMING CONFIGURATION HEADER

EPROM TYPE: 27128 PROG. VOLTAGE: 21.0
APPROXIMATE RVPP VALUE: 3.1K OHMS



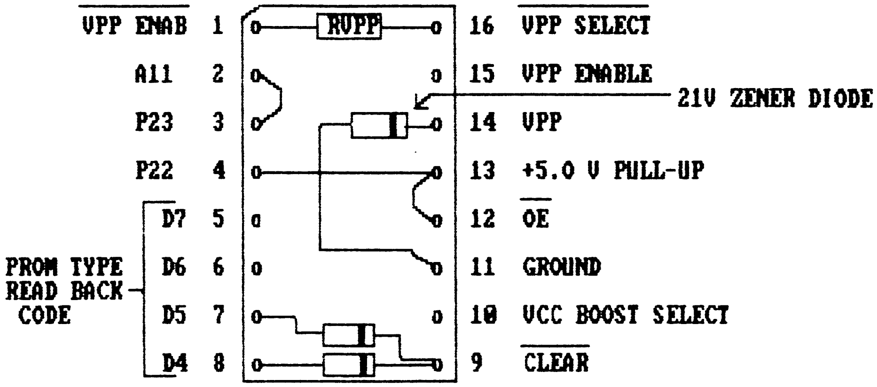
(TOP VIEW OF HEADER IS SHOWN) ↖ DIODES (2) ARE SIL. SIGNAL TYPE

PROGRAMMING CONFIGURATION HEADER
EPROM TYPE: 27128A PROG. VOLTAGE: 12.5
APPROXIMATE RVPP VALUE: 6.6K OHMS

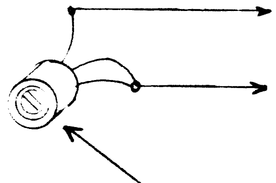


(TOP VIEW OF HEADER IS SHOWN) DIODES (2) ARE SIL. SIGNAL TYPE

PROGRAMMING CONFIGURATION HEADER
EPROM TYPE: 27256 PROG. VOLTAGE: 12.5
APPROXIMATE RVPP VALUE: 6.6K OHMS



(TOP VIEW OF HEADER IS SHOWN) DIODES (2) ARE SIL. SIGNAL TYPE



CONNECT TO PROGRAMMING HEADER PIN 1.

CONNECT TO PROGRAMMING HEADER PIN 16.

MINATURE 10K, 20K, OR 50K POT

DETAILS FOR PERMINANT CONNECTION OF A MINATURE POTENTIOMETER FOR THE Rvpp RESISTOR. Adjust as indicated under calibration procedure.

PARTS LIST - ZPROM-64K EPROM ADAPTOR BOARD

QUANT	DESCRIPTION	ID	KIT #	NOTES
1	- 4040 CMOS COUNTER	U1	2	
3	- MPS3702 TRANS.	Q1,6,7	2	
2	- MPS3704 TRANS.	Q2,8	2	
2	- LM7805 VOLT REG	Q3,4	2	
1	- TIP32 TRANS.	Q5	2	
1	- RED LED	LED	2	
1	- 7407	U2	2	
1	- LM723 VOLT REG IC	U3	2	
1	- 2.7 OHM, 1/4 W	R8	3	
1	- 10 OHM, 1/4 W	R20	3	
1	- 47 OHM, 1/4 W	R6	3	
1	- 100 OHM, 1/4 W	R10	3	
1	- 240 OHM. 1/4 W	R5	3	
2	- 470 OHM, 1/4 W	R9,14	3	
6	- 1K OHM, 1/4 W	R1,7,16, 17,21,22	3	
1	- 2.7K OHM, 1/4 W	R18	3	
5	- 4.7K OHM, 1/4 W	R2,3,5, 13,15	3	
1	- 10.0K OHM, 1%	R19	3	
2	- 22K OHM, 1/4W	R11,12	3	
2	- 4.7K 10 PIN SIP	RN1,RN2	3	SINGLE IN-LINE RESISTOR PACK
4	- 1uF TAN	C1,3,4,6	3	
1	- .1 uF 25V CER	C2	3	BYPASS CAPACITOR
1	- 28 PIN ZIF SOCKET	---	5	EPROM SOCKET
1	- 16 PIN ZIF SOCKET	---	6	PERSONALITY MODULE SOCKET
1	- CIRCUIT BOARD	---	1	AVAILABLE ONLY FROM BGD
1	- PARTS LIST	---	1	AVAILABLE ONLY FROM BGD
1	- SCHEMATIC	---	1	AVAILABLE ONLY FROM BGD
1	- 26 PIN DUAL HDR	J2	4	CONNECTS TO CPU BOARD
1	- 3 PIN SINGLE HDR	J1	--	SEE NOTE 1
	- EPROM CONFIG HDRS AS NEEDED	---		SEE HEADER PARTS LISTS AND CONSTRUCTION DETAILS

NOTES: 1. This connector is used to provide power to the adaptor board. The header maybe ommitted and the power wires may be soldiered directly to the ADAPTOR PWB.

PARTS LIST - ZPROM-64K CPU BOARD

QUANT	DESCRIPTION	ID	KIT #	NOTES
1 -	Z-80 PIO CHIP	IC1	2	
1 -	74LS138	IC2	2	
1 -	Z-80 CPU [3880]	IC3	2	
1 -	EPROM W/FIZZLE	IC4	1	AVAILABLE ONLY FROM BGD
1 -	74LS157	IC5	2	
8 -	4164 RAM	IC7..IC14	2	150 ns ACCESS TIME PREFERED
1 -	1488	IC15	2	
1 -	1489	IC16	2	
1 -	Z80-DART [SIO/0]	IC17	2	
1 -	Z-80 CTC	IC18	2	
1 -	74LS08	IC19	2	NOTE: STANDARD OR "S" PARTS
1 -	74LS00	IC20	2	MAY BE SUBSTITUTED FOR
1 -	74LS14	IC21	2	THE TTL PARTS SPECIFIED.
2 -	74LS74	IC22,24	2	
1 -	74LS112	IC23	2	
1 -	74LS02	IC25	2	
3 -	1.5K OHM,1/4 W	R1,2,3	3	
1 -	470 OHM, 1/4 W	R4	3	
1 -	33 OHM, 1/4 W	R4	3	
2 -	22K OHM, 1/4 W	R6,7	3	
1 -	10K OHM, 1/4 W	R8	3	
2 -	470 OHM, 1/4 W	R9,R10	3	
4 -	470 PF SILVR MICA	C1..C4	3	SEE NOTE #1
1 -	33 PF SILVR MICA	C5	3	
2 -	22 uFD, 15V TAN.	C6,C7	3	
1 -	.33 uFD,15V MYLAR	C8	3	
23 -	.1 uF DISK BYPASS	CX	3	CERAMIC DISK OR MONOLYTHIC OK
1 -	4.7-22 uFD TAN.	CY	3	PROVIDES BULK DECOUPLING
1 -	RESET SWITCH	PB1	--	SEE NOTE #2
1 -	4.9152 MHZ XTAL	CY1	2	SEE NOTE #3
1 -	4.7K OHM PACK	RP1	3	VALUES FROM 4.7K TO 10K ARE OKAY
1 -	2N3906 TRANSISTOR	Q1	2	
1 -	SIL. SIGNAL DIODE	D1	2	
8 -	14 PIN IC SOCKET	--	4	USE FOR 14 PIN CHIPS
12 -	16 PIN IC SOCKET	--	4	USE FOR 16 PIN CHIPS
2 -	28 PIN IC SOCKET	--	4	USE FOR 28 PIN CHIPS
3 -	40 PIN IC SOCKET	--	4	USE FOR 40 PIN CHIPS
1 -	26 PIN DUAL HEADER	HDR1	4	PARALLEL I/O CONNECTOR
1 -	9 PIN HEADER	HDR2	--	SEE NOTE #4
1 -	9 PIN HEADER	HDR3,4	--	SEE NOTE #5
1 -	CIRCUIT BOARD	--	1	AVAILABLE ONLY FROM BGD
1 -	SCHEMATIC	--	1	AVAILABLE ONLY FROM BGD
1 -	PARTS PLACEMENT	--	1	AVAILABLE ONLY FROM BGD

NOTES:

1. These capacitors are used for slowing the the rise time of the serial link lines. These parts are optional.
2. A Panasonic EVQ-P1R04K switch will fit on the PWB. Any single pole, normally open switch can be remotely wired to the reset switch pads on the PWB.
3. The accuracy of the Xtal determines the accuracy of the BAUD rate of the serial link. Any xtal in the range of 4.9 - 5.0 Mhz should give satisfactory results.
4. This 9-pin header is used to provide power to the CPU board. The header may be ommited and the power wires may be soldered directly to the CPU PWB.
5. These 9-pin headers are used to connect connect to the two serial channels of the CPU. These connectors may be ommited and the serial link wires soldered directly to the CPU PWB.

PARTS LIST - ZPROM-64K EPROM CONFIGURATION HEADERS

QUANT	DESCRIPTION	KIT #	NOTES
	2716 CONFIGURATION HEADER		
1	16 PIN HEADER	4	
2	SILICON SIGNAL DIODE	2	USE 1N4148 OR EQUIV.
1	VPP RESISTOR	--	SEE NOTE 1
--	JUMPER WIRE, AS NEEDED	--	
	2732 CONFIGURATION HEADER		
1	16 PIN HEADER	4	
2	SILICON SIGNAL DIODE	2	USE 1N4148 OR EQUIV.
1	1K OHM, 1/4 W RESISTOR	3	
1	VPP RESISTOR	--	SEE NOTE 1
--	JUMPER WIRE, AS NEEDED	--	
	2732A CONFIGURATION HEADR		
1	16 PIN HEADER	4	
2	SILICON SIGNAL DIODE	2	USE 1N4148 OR EQUIV.
1	1K OHM, 1/4 W RESISTOR	3	
1	VPP RESISTOR	--	SEE NOTE 1
--	JUMPER WIRE, AS NEEDED	--	
	2764 CONFIGURATION HEADR		
1	16 PIN HEADER	4	
2	SILICON SIGNAL DIODE	2	USE 1N4148 OR EQUIV.
1	VPP RESISTOR	--	SEE NOTE 1
--	JUMPER WIRE, AS NEEDED	--	
	2764A CONFIGURATION HEADR		
1	16 PIN HEADER	4	
2	SILICON SIGNAL DIODE	2	USE 1N4148 OR EQUIV.
1	VPP RESISTOR	--	SEE NOTE 1
--	JUMPER WIRE, AS NEEDED	--	
	27128 CONFIGURATION HEADR		
1	16 PIN HEADER	4	
2	SILICON SIGNAL DIODE	2	USE 1N4148 OR EQUIV.
1	21 VOLT ZENER DIODE	--	OPTIONAL OVER VOLT PROTECTION
1	VPP RESISTOR	--	SEE NOTE 1
--	JUMPER WIRE, AS NEEDED	--	
	27128A CONFIGURATION HDR		
1	16 PIN HEADER	4	
2	SILICON SIGNAL DIODE	2	USE 1N4148 OR EQUIV.
1	13 VOLT ZENER DIODE	--	OPTIONAL OVER VOLT PROTECTION
1	VPP RESISTOR	--	SEE NOTE 1
--	JUMPER WIRE, AS NEEDED	--	

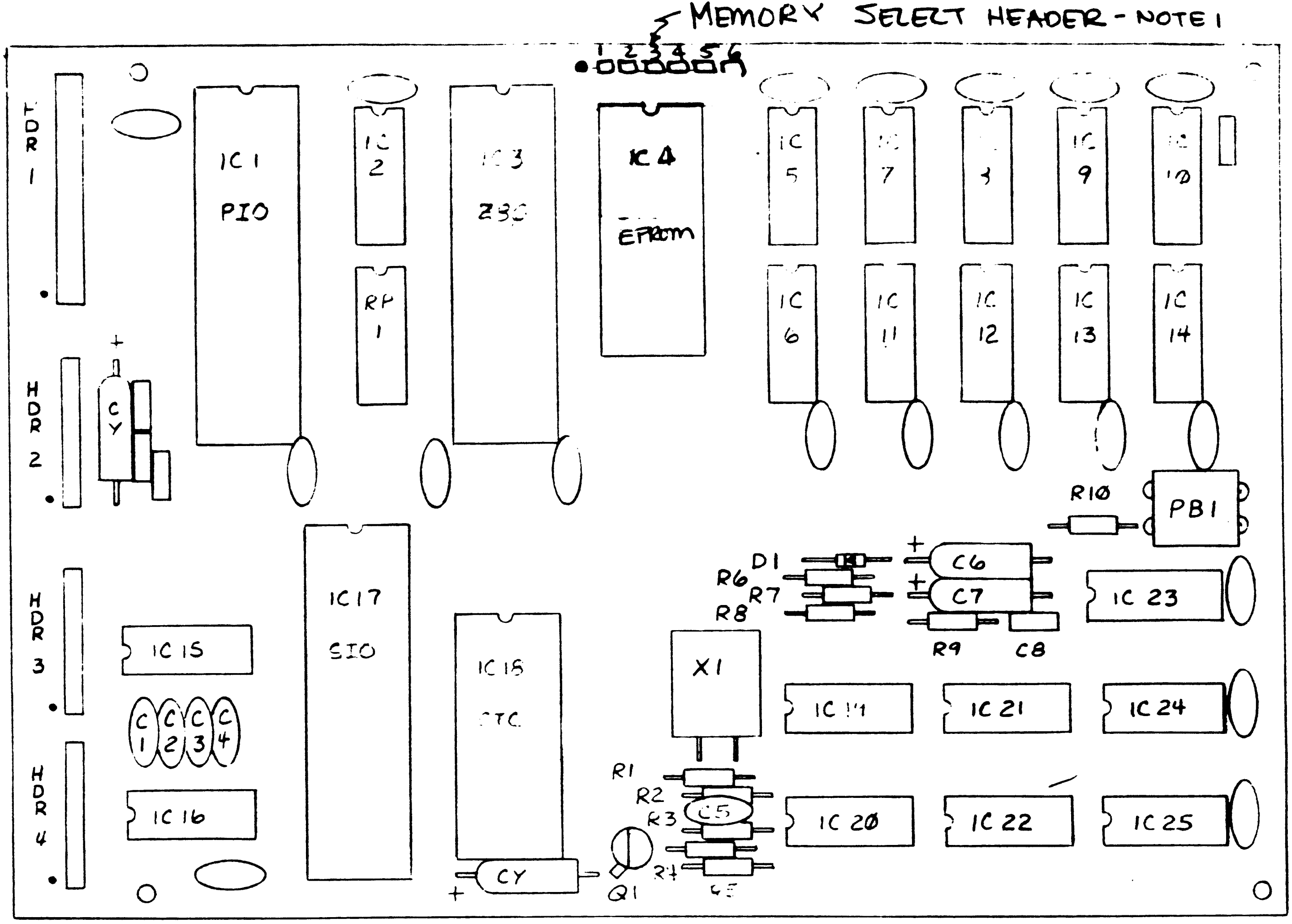
PARTS LIST - ZPROM-64K EPROM CONFIGURATION HEADERS

QUANT		DESCRIPTION	KIT #	NOTES
		27256 CONFIGURATION HDR		
1	-	16 PIN HEADER	4	
2	-	SILICON SIGNAL DIODE	2	USE 1N4148 OR EQUIV.
1	-	13 VOLT ZENER DIODE	--	OPTIONAL OVER VOLT PROTECTION
1	-	VPP RESISTOR	--	SEE NOTE 1
--	-	JUMPER WIRE, AS NEEDED	--	

NOTES: 1. Approximate resistor values are shown on header assembly drawings. Actual values need to be determined during the programming voltage calibration proceedure.

Ten turn, 10 K ohm potentiometers maybe substituted making contruction and calibration somewhat easier.

ZPROM-64K-CPU

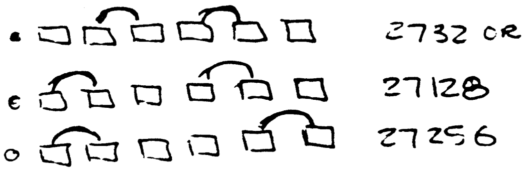


ZPROM-64K CPU (COMPONENT SIDE DATE CODE UNDER CRYSTAL)

ZGPC(Z80 GENERAL PURPOSE CONTROLLER)FEATURES

Z80 CPU
64K RAM
4K OR 8K EPROM (2732/2764)
16 BITS PARALLEL(PIO)
2 SERIAL RS232 PORTS(DART/SIO-0)
SOFTWARE BAUD RATE GENERATION
2 USER COUNTER/TIMER CHANNELS(CTC)

NOTE 1. SET MEMORY SELECT JUMPERS AS FOLLOWS BASED ON EPROM USED



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ZGPC SPECIFICATIONS

I/O PORT DEFINITIONS

PIOAD	70H	SIOAD	60H	CTC0	50H(BAUD RATE FOR SIOA)
PIOAC	71H	SIOAC	61H	CTC1	51H(BAUD RATE FOR SIOB)
PIOBD	72H	SIOBD	62H	CTC2	52H
PIOBC	73H	SIOBC	63H	CTC3	53H
BANK	40H(00=ROM 01=ROM DISABLED)				

CONNECTOR PINOUTS

HDR1(PARALLEL)

1	/ARDY	2	/BRDY
3	/ASTB	4	/BSTB
5	A0	6	B0
7	A1	8	B1
9	A2	10	B2
11	A3	12	B3
13	A4	14	B4
15	A5	16	B5
17	A6	18	B6
19	A7	20	B7
21	GND	22	+5V
23	GND	24	+5V
25	GND	26	+5V

HDR2(POWER)

1	GND
2	-12
3	-12
4	+12
5	+12
6	+5
7	+5
8	GND
9	GND

HDR3(SIOA)

1	/DCDA
2	/CTSA
3	/RTSA
4	RXDA
5	/DTRA
6	TXDA
7	+12
8	GND
9	-12

HDR4(SIOB)

1	NC.
2	NC.
3	~~RXDB~~ N.C.
4	~~NC.~~ RXDB
5	NC.
6	TXDB
7	+12
8	GND
9	-12

PARTS LIST

IC1	PIO
IC2	74LS138
IC3	Z80
IC4	2732/2764/27128/256
IC5	74LS157
IC7-14	RAMS(NOTE2)
IC15	1488
IC16	1489
IC17	DART SIO/0
IC18	CTC
IC19	74LS08
IC20	74LS00
IC21	74LS14
IC22,24	74LS74
IC23	74LS112
IC25	74LS02

R1-3	1.5K
R4	470
R5	33
R6,R7	22K
R8	10K
R9,R10	470
C1-C4	470PF(OPTIONAL)
C5	33PF
C6,C7	22UF
C8	.33UF
C9,C10	22UF
CX[23]	.1UF
CY[3]	4.7-22UF

CY1	4.9152 MHZ.(NOTE 1)
RP1	16-02-472 RESISTOR NETWORK
SW1	RESET SWITCH PANASONIC # EVQ-P1R04K(DIGI-KEY)
D1	1N914.
Q1	2N3906
HDR1	26 PIN CA-D26SP100-230-430 (PARALLEL I/O)
HDR2	9 PIN OR 4 PIN TERMINAL BLOCK
HDR3	9 PIN (SIO A I/O)
HDR4	9. PIN (SIO B I/0)

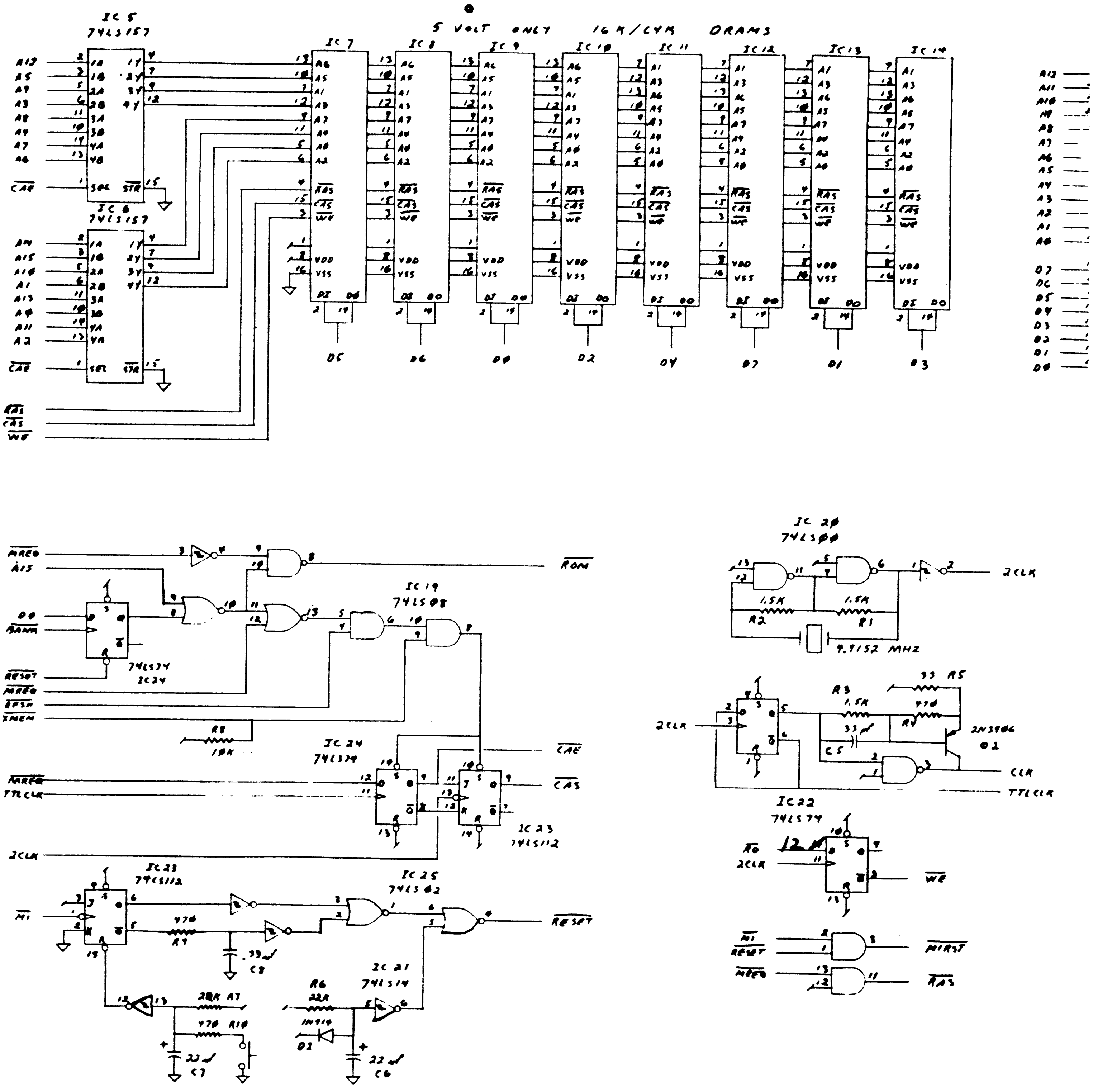
IC SOCKETS 14 PIN[8],16 PIN[12],28 PIN[2],40 PIN[3]

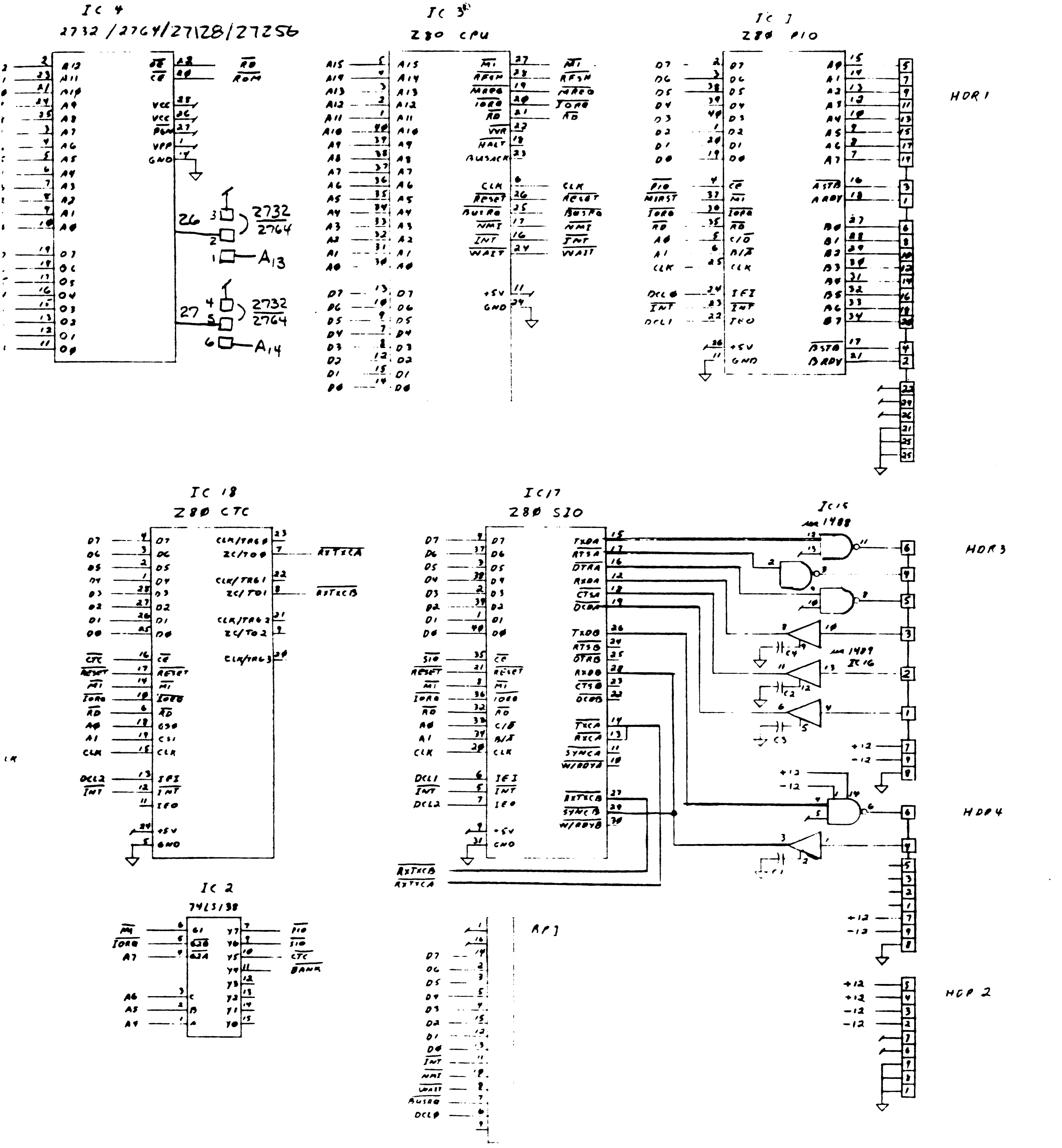
NOTE1: 4.9152 FOR STANDARD ZMON MONITOR + FIZZLE MONITOR
AT Z80 CLOCK FREQUINCES GREATER THAN 2.5 MHZ.(5 MHZ CRYSTAL)
ALL Z80A PARTS AND FAST ENOUGH RAMS AND ROMS MUST BE USED

NOTE2: USE 5 VOLT 128 ROW REFRESH 16K OR 64K DYNAMIC RAMS

	16K	64K
INTEL	2118	2164
HITACHI	4816	4864
NEC	2118	4164
MOSTEK	4516	4564
OKI		3764
FUTJSI		8264

NOTE3: IF ANY Z80 PERIPHERAL DEVICE IS OMITTED JUMPER IEO PIN TO
IEI TO ALLOW INTERUPTS(REFER TO SCHEMATICS FOR PIN NUMBERS)


5 VOLT ONLY 16K/64K DRAMS
IC 5 74LS157
IC 6 74LS157
IC 7
IC 8
IC 9
IC 10
IC 11
IC 12
IC 13
IC 14
A12
A5
A4
A3
A8
A9
A7
A6
A14
A15
A10
A1
A13
A0
A11
A2
CAE
SEL
STR
RAS
CAS
WE
VDD
VSS
DI
DO
D5
D6
D0
D2
D4
D7
D1
D3
MREQ
A15
D0
BANK
RESET
RFSH
XMEM
ROM
74LS74 IC24
IC 19 74LS08
R8 10K
IC 24 74LS74
TTLCLK
2CLK
IC 23 74LS112
IC 23 74LS112
M1
IC 25 74LS02
470 R9
.33uf C8
28K R7
470 R10
22uf C7
R6 22K
1N914 D1
IC 21 74LS14
22uf C6
IC 20 74LS00
1.5K R2
1.5K R1
9.9152 MHZ
2CLK
R3 1.5K
33 R5
470 R4
33pf C5
2N3906 Q1
CLK
TTLCLK
IC 22 74LS74
12 M
A0
WE
M1RST
RAS
A12
A11
A10
A9
A8
A7
A6
A5
A4
A3
A2
A1
A0
D7
D6
D5
D4
D3
D2
D1
D0


IC 4
2732 /2764/27128/27256
2732
2764
A13
2732
2764
A14
IC 3
Z80 CPU
IC 1
Z80 PIO
HDR 1
IC 18
Z80 CTC
IC 17
Z80 SIO
IC 15
1488
1489
IC 16
HDR 3
HDR 4
HDR 2
IC 2
74LS138
RP 1
RD
ROM
M1
RFSH
MREQ
IORQ
WR
HALT
BUSACK
CLK
RESET
BUSRQ
NMI
INT
WAIT
+5V
GND
VCC
VPP
PGM
OE
CE
ASTB
ARDY
BSTB
BRDY
IEI
IEO
C/D
B/A
CLK/TRG0
ZC/TO0
CLK/TRG1
ZC/TO1
CLK/TRG2
ZC/TO2
CLK/TRG3
RXTXCA
RXTXCB
TXDA
RTSA
DTRA
RXDA
CTSA
DCDA
TXDB
RTSB
DTRB
RXDB
CTSB
DCDB
TXCA
RXCA
SYNCA
W/RDYA
SYNCB
W/RDYB
CE
PIO
SIO
CTC
BANK
G1
G2B
G2A
DCL0
DCL1
DCL2
C4
C2
C3
C1
+12
-12

ZPROM-64K
PROG. ADAPTOR

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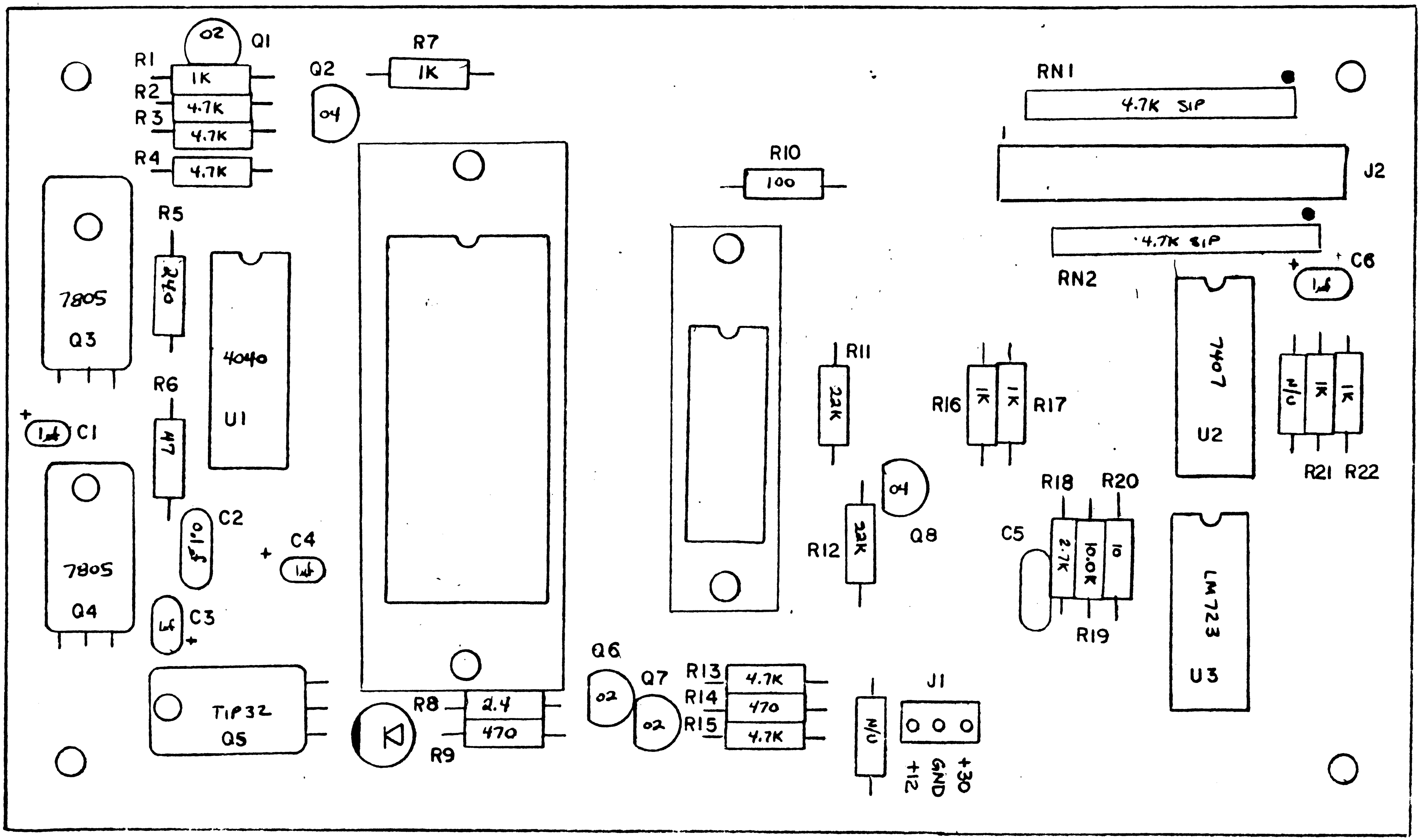
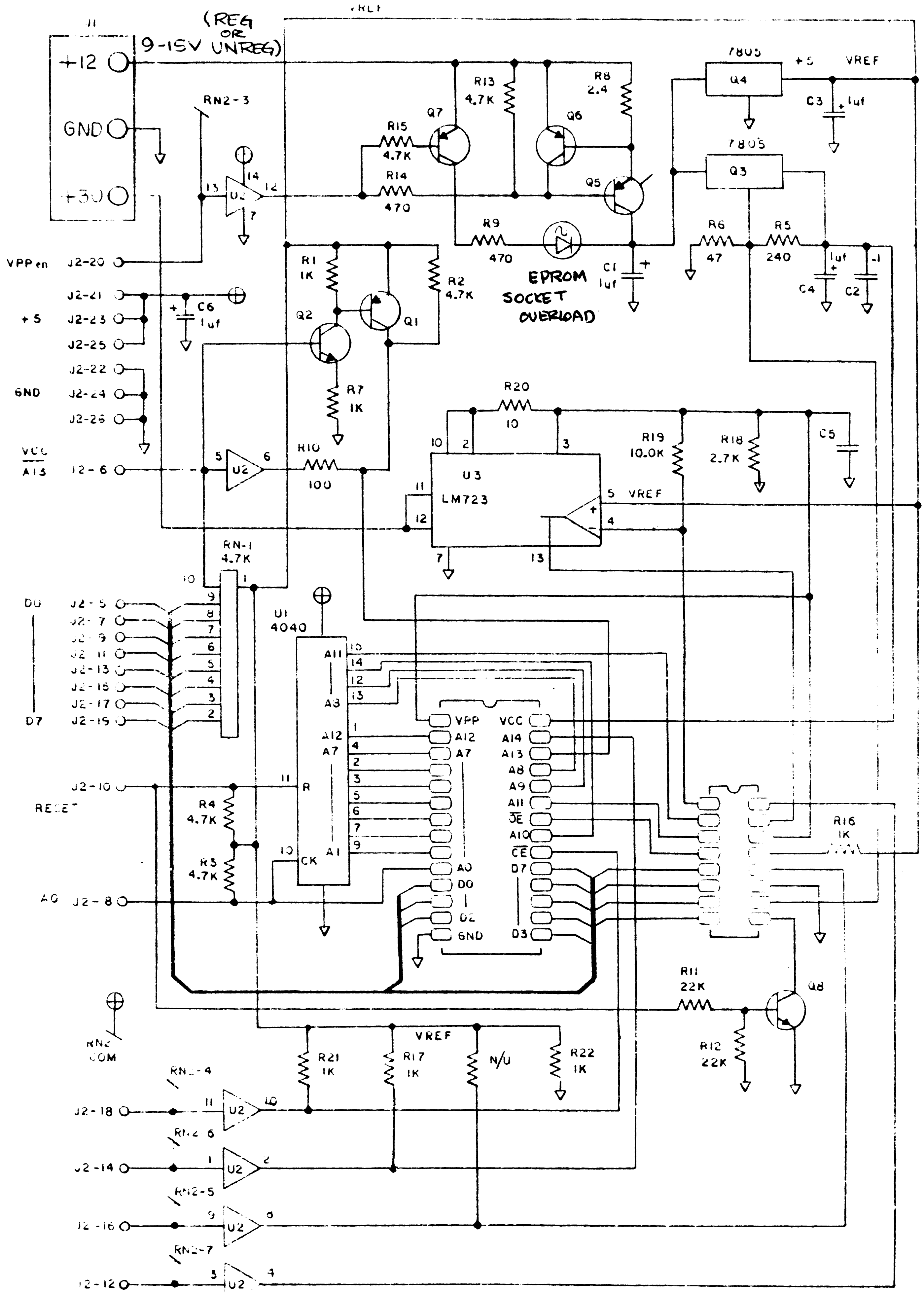
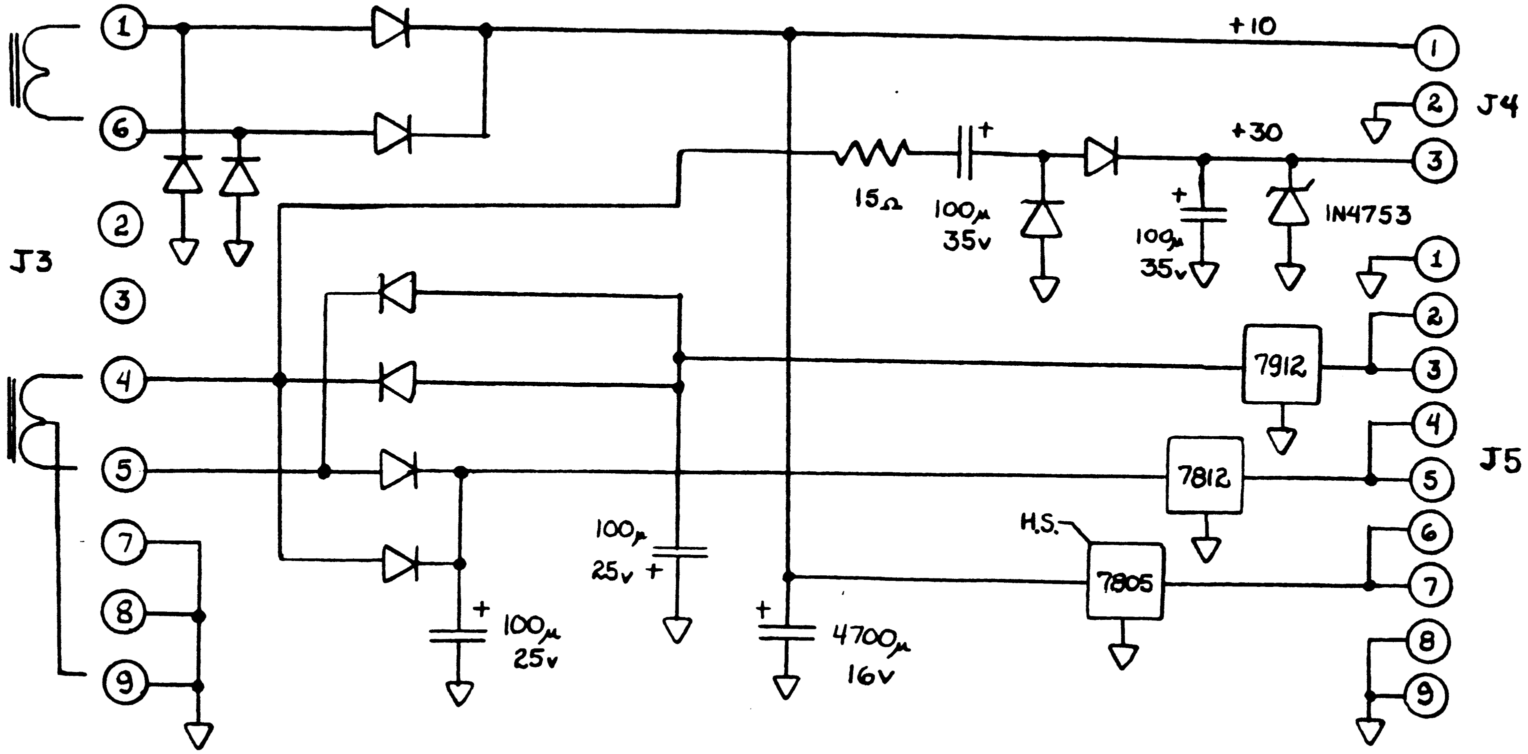
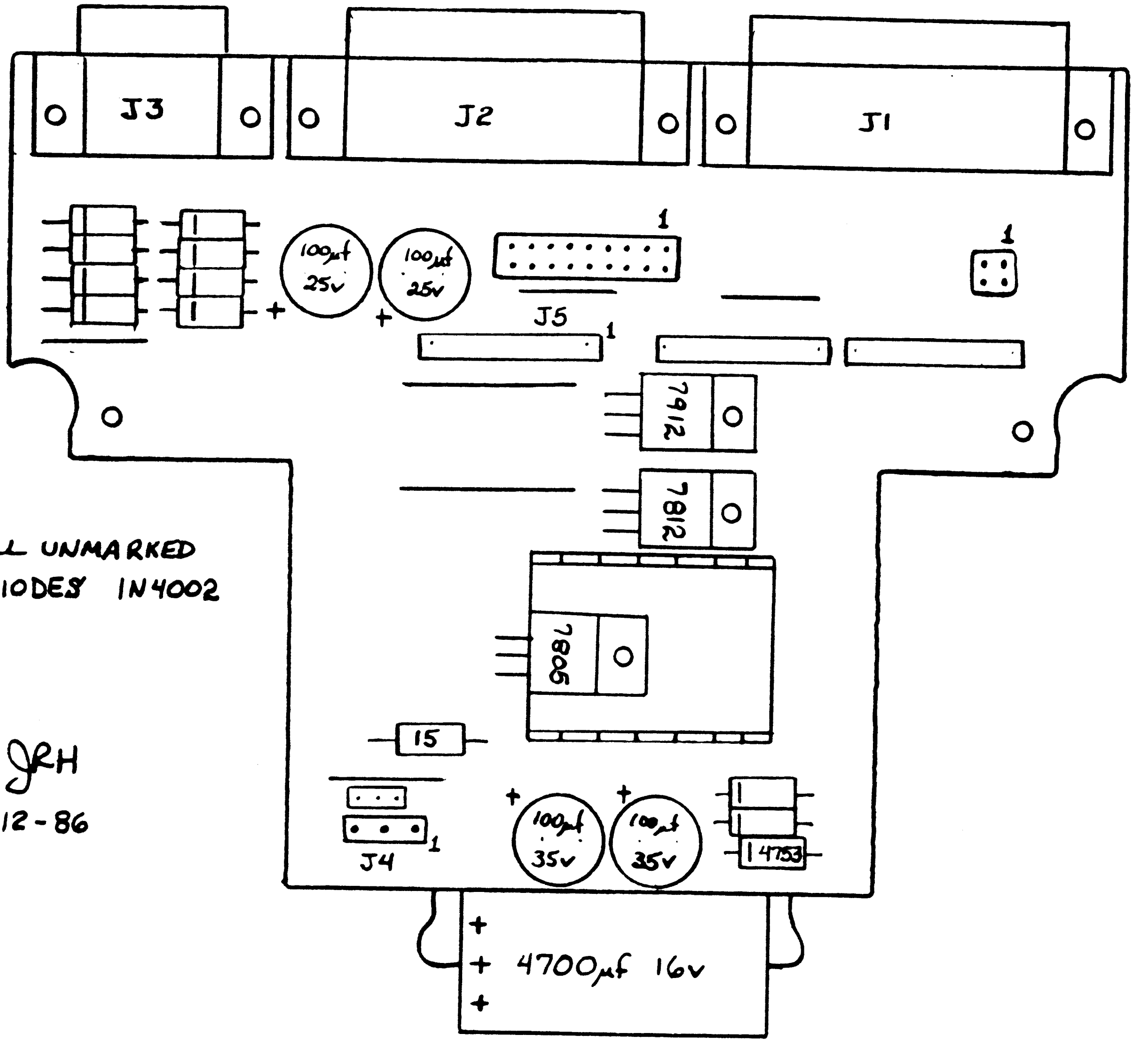




Z PROM PROGRAMMER ADAPTOR

JRH 11-30-84





ALL UNMARKED
DIODES IN4002

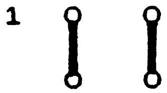
JRH
12-86

Z80 Power Supply Board

This board generates the power supplies used by the Z80 card as well as the voltages needed for the PROM programming card. DB-25 connectors and null-modem jumpers allow easy configuration of the serial ports. A special layout technique allows use of either Male or Female DB-25 connectors. See the foot-notes for conflicting pins.

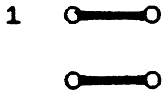
Jumper usage is as follows:

Port 1



Pin 2 - Send
Pin 3 - Receive

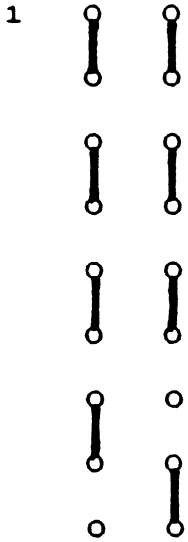
Note: Cut or remove pins 11,12 to prevent conflicts with full 25 pin cables.



Pin 2 - Receive
Pin 3 - Send

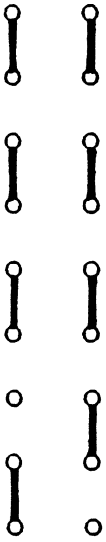
Port 2

Female Connector to Terminal. (Null Modem)

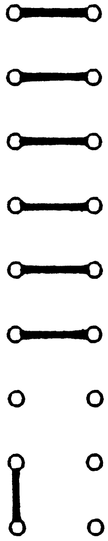


1 Gnd
2 Rec.
3 Send
4 to DCD
5 to DTR
6 to DTR
8 to RTS
20 to CTS

Male Connector to Terminal. (Null Modem)

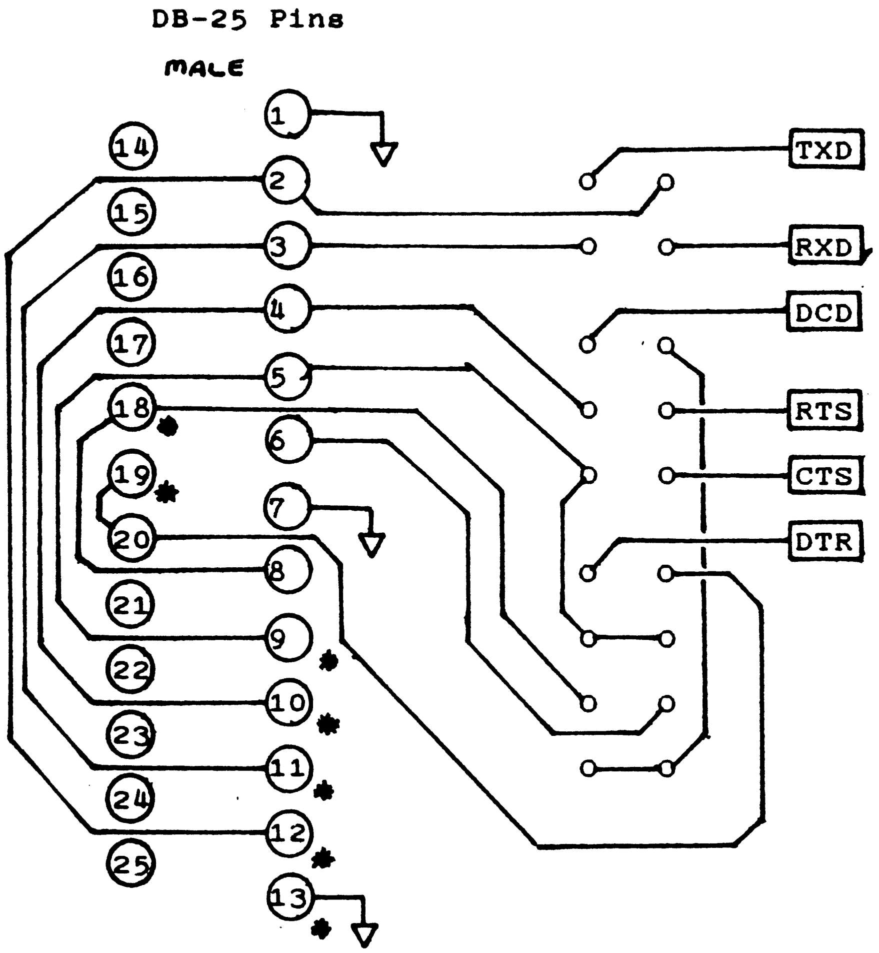


Male Connector to Modem.



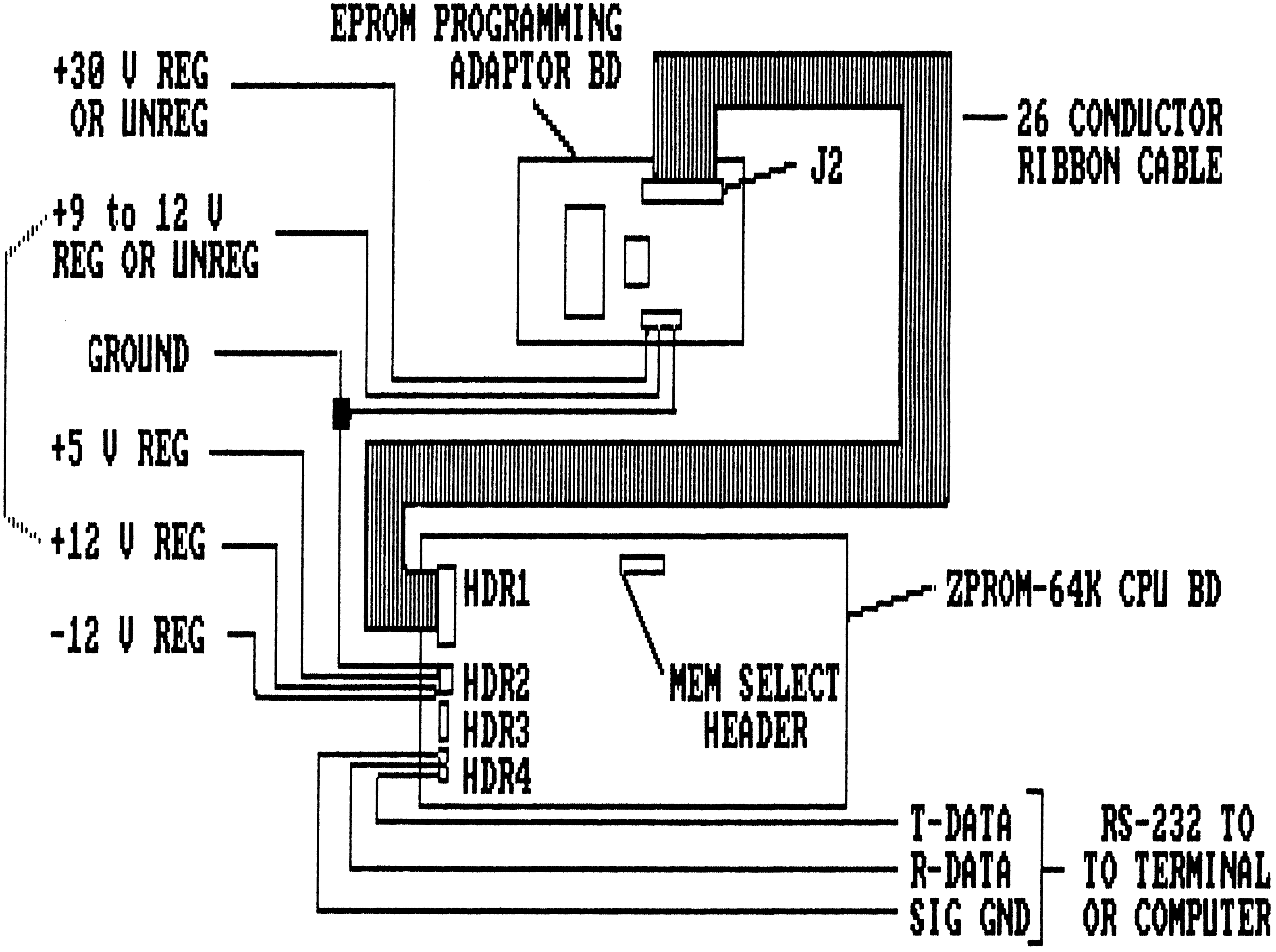
1 - Gnd
2 - Send
3 - Rec.
5 - CTS
8 - DCD
20 - DTR

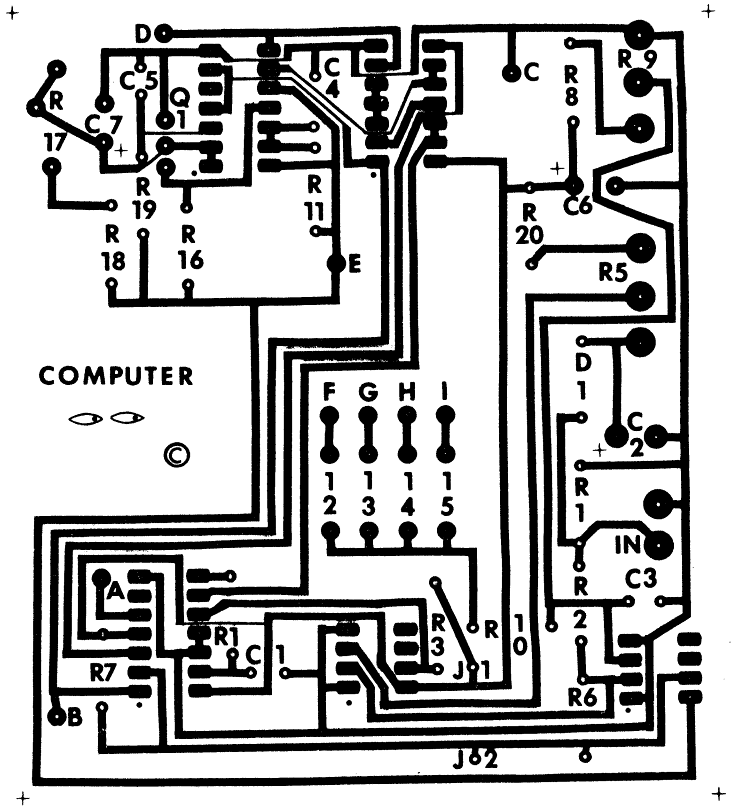
Port 2 Interconnections



Note: Pins 9,10,11,12,13,18,19 may conflict with some systems. These pins should be cut if full 25 pin cables are used.

ZPROM-64K WIRING DIAGRAM




D
C5
Q1
C4
C
R8
R9
R17
C7
R19
R18
R16
R11
E
R20
C6
R5
D1
C2
R1
IN
R2
C3
F
G
H
I
12
13
14
15
COMPUTER
©
A
R1
C1
R3
R10
J1
R7
R6
B
J2

NEW!

BGD TECHNOLOGY is Proud to Announce...

ZPROM-64K

PROFESSIONAL GRADE EPROM PROGRAMMER KIT

Now the convenience, speed, and features of a commercial grade EPROM programmer are available for an affordable price! The ZPROM-64K is a full featured EPROM programmer for the serious electronics enthusiast.

The ZPROM-64K programmer is based on a powerful single board computer. This Z-80 computer has a full 64K bytes of RAM memory, two serial I/O channels, a 16 bit programmable parallel port, and an on board counter-timer chip. The processor connects to an EPROM programmer adaptor board through the parallel port, and communicates via a 9600 baud serial communications link to a CRT terminal or a personal computer. A full function machine monitor program, FIZZLE X.2, supports peek, poke, define breakpoints, execute user program, and more. Additionally, the following high level EPROM programming functions are supported:

- Display EPROM type
- EPROM Blank Check
- EPROM Read (Read Master into ZPROM-64K memory)
- Generate and Display EPROM CheckSum
- Generate and Display ZPROM-64K RAM CheckSum
- Display Memory Contents (Displays Hex and ASCII values)
- Modify ZPROM-64K RAM Data
- Fill RAM With Specified Value
- Program EPROM (From ZPROM-64K Memory)
- Verify EPROM (Compare With Memory Contents)
- Input Hex Tape Data (Accept Intel Hex formatted data)
- Output Hex Tape Data (Output Intel Hex formatted data)
- Display HELP Command Summary Screen

High speed intelligent programming algorithms assure data integrity, while achieving remarkable programming speed. Fully electronic EPROM socket power and programming voltage switching, prevents device damage during EPROM insertion and removal. Through the use of simple personality modules, ZPROM-64K will read and program the following EPROM families:

TYPE	SIZE	Vpp	PROGRAMMING TECHNIQUE
2716	- 2K X 8	25.0	50 Ms Programming Pulse
2732	- 4K X 8	25.0	50 Ms Programming Pulse
2732A	- 4K X 8	21.0	50 Ms Programming Pulse
2764	- 8K X 8	21.0	Intelligent Programming Algorithm
27128	- 16K X 8	21.0	Intelligent Programming Algorithm
27128A	- 16K X 8	12.5	Intelligent Programming Algorithm
27256	- 32K X 8	12.5	Intelligent Programming Algorithm

Additionally, the new CMOS families which utilize these standard programming voltages and sequences are also accommodated.

ZPROM-64K Power Requirements

Voltage	Current	Usage
+5	1.0 A Max	Logic Power Supply
+12	500Ma Max	RS-232 Driver
-12	50 Ma Max	RS-232 Driver
+30	200 Ma Max	Used to Generate Vpp

ZPROM-64K Kit Pricing and Availability

KIT NUMBER	DESCRIPTION	PRICE	AVAILABILITY
ZPROM-64K-1	Blank Circuit Board Kit 1-Main Computer PWB 1-EPROM Prog. Adapter PWB 1-FIZZLE Program in EPROM 1-Parts List, Schematic, assembly and test guide	$59.00	Sept. 1985
ZPROM-64K-2	Semiconductor Kit Contains all semiconductors, (Chips, transistors, Diodes) required for Main Computer and Programming adapter Also includes 4.9 Mhz Crystal	$65.00	Oct. 1985
ZPROM-64K-3	Capacitor-Resistor Kit Includes Vpp control resistors used in personallity modules	$16.00	Oct. 1985
ZPROM-64K-4	Connector/Interconnect Kit Includes Headers and inter-board ribbon cable parts	$19.00	Oct. 1985
ZPROM-64K-5	28 Pin TEXTOOL ZIF Socket	$12.00	Oct. 1985
ZPROM-64K-6	16 Pin ZIF Socket (For Personality Modules)	$ 8.00	Oct. 1985

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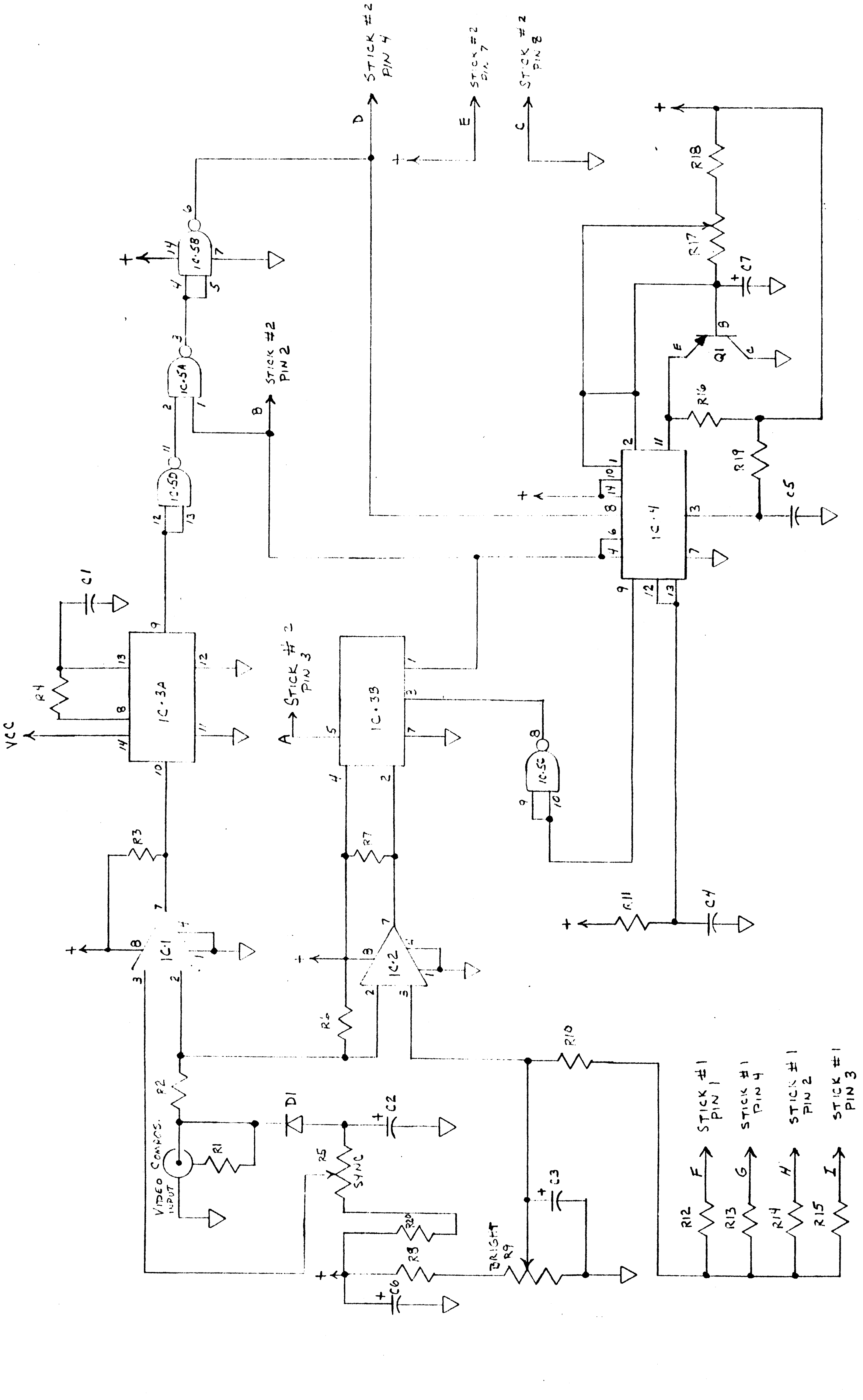
STICK #2 PIN 4
STICK #2 PIN 7
STICK #2 PIN 8
D
E
C
IC-5B
IC-5A
IC-5D
IC-5C
STICK #2 PIN 2
B
VCC
R4
C1
IC-3A
IC-3B
A
STICK #2 PIN 3
IC-4
R18
R17
C7
Q1
R16
R19
C5
R3
R7
IC-1
IC-2
R6
R11
C4
R2
R1
D1
C2
VIDEO COMPOS. INPUT
R5
SYNC
R20
R8
C6
C3
BRIGHT R9
R10
R12
R13
R14
R15
F
G
H
I
STICK #1 PIN 1
STICK #1 PIN 4
STICK #1 PIN 2
STICK #1 PIN 3